Table 11: **gp41** 

| Location                  | WEAU   | Sequence  | Immunogen   | Species(HLA)   | References                                      |
|---------------------------|--|---|---|--|---|
| gp41(519–543)             | gp41(9–33) <b>NOTES:</b>   | FLGFLGAAGSTMGAASL-<br>TLTVQARC  | peptide   | $\operatorname{murine}(\operatorname{H-2}^{bxk,sxd})$    | [Sastry & Arlinghaus(1991)]                     |
|                           | <ul><li>Peptides in</li></ul>  | Peptides induced T-cell proliferative response to immunizing peptide and to gp160   | mmunizing peptide and to  | gp160  |   |
| env(519–543)              | gp41(9-33)   | FLGFLGAAGSTMGAASL-TLTVOARC  | Peptide<br>immunization   | rhesus monkey  | [Nehete et al.(1993)]                           |
|                           | NOTES: • Synthetic I mice, and i • Proliferativ  | <b>TES:</b> Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice, and in rhesus monkeys Proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys   | of the HIV-1 envelope tha<br>1 in 3/3 immunized rhesus  | t stimulates a proliferativ<br>monkeys                   | e response in                                   |
| gp41(547–561<br>IIIB B10) | gp41(37–51)  | GIVQQQNNLLRAIEA   | HIV infection   | human  | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                           | NOTES: • 12 gag and  | T <b>ES:</b><br>12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses   | could commonly evoke T-   | cell responses   |   |
| gp41(562–576<br>IIIB B10) | gp41(52-66)  | QQHLLQLTVWGIKQL   | HIV infection   | human  | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                           | NOTES: • 12 gag and  | TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  | could commonly evoke T-   | cell responses   |   |
| gp41(584–609<br>LAI)      | gp41(69–94) <b>NOTES:</b> Stimulates   | 1(69–94) RILAVERYLKDQQLLGI- I WGCSGKLIC? TES: Stimulates T call proliferation in HIV infected denors  | HIV infection   | human  | [Schrier et al.(1989)]                          |
| gp41(572–591)             | gp41(62–81)<br><b>NOTES:</b>   | GIKQLQARILAVERYLKDQQ  | peptide   | $murine(H-2^{d,b})$                                      | [Brown et al.(1995)]                            |
|                           | <ul> <li>This peptide was a g</li> <li>At least one of the for prime T cells in vivo</li> <li>QLQARILAVERY s</li> <li>VERYLKDQQ was</li> </ul> | This peptide was a good immunogen in BALB/c and CBA mice, producing a good proliferative response At least one of the four residues GIKQ enhances stimulation, and in CBA mice these residues influence the ability to prime T cells <i>in vivo</i> QLQARILAVERY stimulated the greatest <i>in vitro</i> T cell response  VERYLKDQQ was the minimal reactive sequence recognized by a T-cell line | and CBA mice, producing a timulation, and in CBA mice. T cell response recognized by a T-cell lin | good proliferative response these residues influence the | s the ability to                                |

| Location               | WEAU                                     | Sequence  | Immunogen  | Species(HLA)                                  | References                                |
|------------------------|--|---|--|---|---|
| gp41(576–591)          | gp41(66–81)<br><b>NOTES:</b>             | LQARILAVERYLKDQQ  | peptide  | $murine(H-2^{d,b})$                           | [Brown et al.(1995)]                      |
|                        | • This peptid response                   | This peptide was a poor immunogen in BALB/c and CBA mice used in this experiment, producing a weak proliferative response   | CBA mice used in this ex                             | periment, producing a weak                    | c proliferative                           |
| gp41(585–615<br>IIIB)  | gp41(68–98)  NOTES:  Identification      | I(68–98) ARILAVERYLKDQQLLG- peptide mur  IWGCSGKLICTTAV  IES: Identification of putative Th epitopes that can stimulate an antibody response in pe  | peptide<br>ulate an antibody respons                 | murine [4<br>e<br>e in peptide immunized mice | [Goodman-Snitkoff<br>et al.(1990)]<br>ice |
| gp41(579–601)          | gp41(69–91)                              | RILAVERYLKDQQLLGG-<br>IWGCSGK   | peptide  | $murine(H-2^{d,b})$                           | [Brown et al.(1995)]                      |
|                        | NOTES:  This peptid This peptid ILAVERYI | TES:  This peptide was a good immunogen in BALB/c and CBA This peptide produced a strong Th response in both mice strains which was more responsive towards GIKQLQAR-ILAVERYLKDQQ and LQARILAVERYLKDQQ than to itself | nd CBA<br>h mice strains which was<br>than to itself | more responsive towards (                     | 3IKQLQAR-                                 |
| env(586–598)           | gp41(76–88)                              | YLRDQQLLGIWGC   | Peptide<br>immunization                              | murine, rhesus<br>monkeys                     | [Nehete et al.(1993)]                     |
|                        | NOTES: • Synthetic p                     | TES:  Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in   | of the HIV-1 envelope th                             | at stimulates a proliferativ                  | e response in                             |
|                        | • Proliferative res                      | mice Proliferative response to this peptide was observed in 1/3 immunized rhesus monkeys, with a weak transient response in the other two   | in 1/3 immunized rhesus                              | monkeys, with a weak trans                    | ientresponse                              |
| gp41(env               | gp41(84–94)                              | GIWGCSGKLIC   | HIV infection  | human   | [Mutch et al.(1994)]                      |
| COMBENDED)             | NOTES: • Core region                     | <b>TES:</b> Core region of peptides that can stimulate proliferative responses from seronegative and seropositive people  | ative responses from sero                            | negative and seropositive p                   | eople                                     |
| gp41(598–609<br>LAV-1) | gp41(83–94)                              | LGLWGCSGKLIC  | peptide  | $murine(H2^d)$                                | [Schrier et al.(1988)]                    |
|                        | NOTES: • Murine T-d                      | <b>TES:</b> Murine T-dependent B-cell response – 7/29 had a proliferative response to this peptide  | proliferative response to t                          | his peptide                                   |   |
| gp41(593–604           | gp41(83–94)                              | LGIWGCSGKLIC  | HIV infection  | human   | [Bell et al.(1992)]                       |
|                        | NOTES: • Elicits T-ce                    | <b>TES:</b> Elicits T-cell proliferation and B cell responses, but only during the asymptomatic   | it only during the asympt                            | omatic phase of HIV infection                 | ion                                       |

## HIV Helper-T Cell Epitopes

| Location     | WEAU   | Sequence   | Immunogen  | Species(HLA)   | References                         |
|--------------|--|--|--|--|------------------------------------|
| gp41(594–603 | gp41(84–93)  | GIWGCSGKLI   | HIV-1 infection  | human  | [Kelleher et al.(1998)]            |
| )            | NOTES:  • Epitope document gp41(594–603 III.)  • Immunization wit p24 antibody titre | IES: Epitope documented as a "previously described" epitope [Bell et al.(1992)], but in Bell et al. it was described as gp41(594-603 IIIB), LGIWGCSGKLIC Immunization with a p24-VLP virus-like particle did not significantly impact CD4+ lymphocyte count, viral load, or p24 antibody titre | pitope [Bell et al.(1992)]<br>d not significantly impact | , but in Bell et al. it was described as CD4+ lymphocyte count, viral load, or | s described as<br>, viral load, or |
|              | <ul> <li>Immunization</li> <li>modest, sho</li> </ul>                                | p24 antibody title Immunization with p24-VLP did not increase the proliferative response to this gp41 epitope, however, there was a modest, short-lived increased proliferative response to p24  | roliferative response to the to p24                      | nis gp41 epitope, howeve   | я, there was a                     |
| gp41(603–614 | gp41(88–99)  | CSGKLICTTAVP?  | HIV infection  | human  | [Schrier et al.(1989)]             |
| LAI)         | NOTES: • Stimulates 7  | TES: Stimulates T-cell proliferation in HIV-infected donors  | DIS  |  |                                    |
| gp41(609–620 | gp41(94–105)   | CTTAVPWNASWS?  | HIV infection  | human  | [Schrier et al.(1989)]             |
| LAI)         | NOTES: • Stimulates 7  | OTES:  Stimulates T-cell proliferation in HIV-infected donors  | )IS  |  |                                    |
| gp41(env     | gp41(99–106)   | PWNASWSN   | HIV infection  | human  | [Mutch et al.(1994)]               |
|              | NOTES: • Core region   | <b>TES:</b><br>Core region of peptides that can stimulate proliferative responses from seronegative and seropositive people  | ive responses from seron                                 | egative and seropositive p   | жорlе                              |
| gp41(IIIB)   | gp41(104–119)  | WSNKSLEDIWDNMTWC   | Peptide priming in vitro                                 | human  | [Manca et al.(1995b)]              |
|              | NOTES: <ul><li>Peptide stim</li><li>Peptide prin</li></ul>                           | <b>Preprise Stimulation of PBMC from non-infected individuals</b> <i>in vitro</i> <b>Peptide priming does not always induce T-cells that recognize whole protein</b>   | lividuals <i>in vitro</i><br>recognize whole protein     |  |                                    |
| gp41(IIIB)   | gp41(124–139)  | EIDNYTNTIYTLLEEC   | Peptide priming <i>in</i><br>vitro                       | human  | [Manca et al.(1995b)]              |
|              | NOTES:  • Peptide stim • Peptide prin  | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein  | dividuals <i>in vitro</i><br>recognize whole protein     |  |                                    |
|              | 1  | 0  | 0  |  |                                    |

| Location                  | WEAU                          | Sequence   | Immunogen                | Species(HLA)                             | References                                      |
|---------------------------|-------------------------------|--|--------------------------|--|---|
| gp41(647–661<br>IIIB B10) | gp41(137–151)                 | EESQNQQEKNEQELL  | HIV infection            | human                                    | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                           | <b>NOTES:</b> • 12 gag and 1: | <b>ES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses     | uld commonly evoke T-    | cell responses                           |   |
| gp41(655–667              | gp41(140-152)                 | QNQQEKNEQELLE?   | HIV infection            | human                                    | [Schrier et al.(1989)]                          |
| LAI)                      | NOTES: • Stimulates T-        | TES: Stimulates T-cell proliferation in HIV-infected donors  | S.                       |  |   |
| gp41(667–681              | gp41(157–171)                 | ASLWNWFNITNWLWY  | HIV infection            | human                                    | [Wahren et al.(1989b), Wahren et al.(1989a)]    |
|                           | <b>NOTES:</b> • 12 gag and 1: | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses    | uld commonly evoke T-    | cell responses                           |   |
| gp41(682–696              | gp41(172–186)                 | IKLFIMIVGGLVGLR  | HIV infection            | human                                    | [Wahren et al.(1989b), Wahren et al.(1989a)]    |
|                           | <b>NOTES:</b> • 12 gag and 1: | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses.   | uld commonly evoke T-    | cell responses                           |   |
| gp41(737–749<br>LAI)      | gp41(222–234)                 | GIEEEGGERDRDR?   | HIV infection            | human                                    | [Schrier et al.(1989)]                          |
| ļ                         | NOTES: • Stimulates T-        | TES: Stimulates T-cell proliferation in HIV-infected donors  | S.                       |  |   |
| gp41(787–801              | gp41(270-284)                 | RIVELLGRRGWEALK  | IIIB gp160               | $\mathrm{murine}(\mathrm{H-2}^{d,k,t4})$ | [Hale et al.(1989)]                             |
| шы                        | NOTES: • Six multidete        | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types | nized by mice of three o | r four MHC types                         |   |
| gp41(801–815              | gp41(284-298)                 | KYWWNLLQYWSQELK  | IIIB gp160               | $murine(H-2^k)$                          | [Hale et al.(1989)]                             |
| HID)                      | NOTES: • Six multidete        | TES: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types        | nized by mice of three o | r four MHC types                         |   |
| gp41(806–820              | gp41(289–303)                 | LLQYWSQELKNSAVS  | IIIB gp160               | $\mathrm{murine}(\mathrm{H-}2^{k,d,t4})$ | [Hale et al.(1989)]                             |
|                           | NOTES: • Six multidete        | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types | nized by mice of three o | r four MHC types                         |   |
|                           |                               |  |                          |  |   |

## HIV Helper-T Cell Epitopes

| Location      | WEAU   | Sequence  | Immunogen   | Species(HLA)  | References                        |
|---------------|--|---|---|---|-----------------------------------|
| gp41(806–820  | gp41(289–303)  | LLQYWSQELKNSAVS   | IIIB gp160  | $\operatorname{murine}(\operatorname{H-2}^{k,d,t4})$          | [Hale et al.(1989)]               |
| шв)           | NOTES: • Six multidete   | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types  | ognized by mice of three o  | or four MHC types   |                                   |
| gp41(IIIB)    | gp41(304-319)  | WLNATAIAVTEGTDRC  | Peptide priming <i>in</i> vitro   | human   | [Manca et al.(1995b)]             |
|               | NOTES: • Peptide stim • Peptide prim                               | <b>IES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein   | ndividuals <i>in vitro</i><br>at recognize whole proteir                              |   |                                   |
| gp41(827–843) | gp41(311–328)<br><b>NOTES:</b>                                     | YVAEGTDRVIEVVQGACR  | HIV-1 infection   | human   | [Caruso et al.(1997)]             |
|               | <ul><li>T cells from HIV antigen.</li><li>The ability to</li></ul> | T cells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71  The ability to express activation markers in response to HIV is retained, but not in response to tetanus toxoid recall | ogress to disease show red<br>ctivation antigens CD25 a<br>se to HIV is retained, but | uced ability to proliferate nd CD71 not in response to tetanu | in response to<br>s toxoid recall |
|               | antigen • This study in to <i>in vitro</i> sti                     | antigen  This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression, response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env peptides, or else p17 and p24   | ı in PBMC from patients ii<br>ng four antigenic Env pep                               | 1 various stages of progres<br>tides, or else p17 and p24     | sion, response                    |
| gp41(828–842  | gp41(311–325)  | AVAEGTDRVIEVVQG   | IIIB gp160  | $murine(H-2^k)$   | [Hale et al.(1989)]               |
| , min,        | NOTES: • Six multidete   | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types  | ognized by mice of three o  | or four MHC types   |                                   |
| gp41(834–842  | gp41(317–325)  | DRVIEVVQG   | IIIB gp160  | $murine(H-2^k)$   | [Hale et al.(1989)]               |
| ,             | NOTES: • Suggested H   | <b>TES:</b> Suggested H- $2^k$ epitope based on region of overlap   | Þ   |   |                                   |
| gp41(834–848  | gp41(317–331)  | DRVIEVVQGAYRAIR   | IIIB gp160  | $murine(H-2^{k,i5})$  | [Hale et al.(1989)]               |
| IIID)         | NOTES: • Six multidete   | <b>IES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types  | ognized by mice of three o  | or four MHC types   |                                   |
|               | • Called Th4.1 and TH4   | and TH4   | 8   |   |                                   |

| Location              | WEAU   | Sequence  | Immunogen                   | Species(HLA)               | References              |
|-----------------------|--|---|-----------------------------|----------------------------|-------------------------|
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | peptide priming gp160 boost | rhesus monkeys             | [Hosmalin et al.(1991)] |
|                       | NOTES: • Epitope TH4: Peptide • Called Th4.1 and TH4           | <b>TES:</b> Epitope TH4: Peptide priming to induce T-cell help enhances antibody response to Called Th4.1 and TH4                                       | enhances antibody respo     | nse to gp160 immunization  | n                       |
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | HIV infection               | human                      | [Clerici et al.(1997)]  |
|                       | NOTES: • Epitope TH4:  | <b>)TES:</b> Epitope TH4: used in a study of the influence of Pentoxifyllines on HIV specific T   | toxifyllines on HIV spec    | ific T cells               |                         |
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | HIV exposure                | human                      | [Pinto et al.(1995)]    |
|                       | NOTES: • Epitope TH4: CTL act • Called Th4.1 and TH4           | OTES:  Epitope TH4: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers Called Th4.1 and TH4       | Γ helper reactivity in expo | ssed but uninfected health | care workers            |
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | HIV infection               | human                      | [Clerici et al.(1991a)] |
|                       | NOTES: • Epitope TH4: Peptide: • Called Th4.1 and TH4          | OTES:  Epitope TH4: Peptides stimulate Th cell function and CTL activity in similar patient populations Called Th4.1 and TH4                            | d CTL activity in similar   | patient populations        |                         |
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | rgp160                      | human                      | [Clerici et al.(1991b)] |
|                       | NOTES:  • Epitope TH4: Immun infection  • Called Th4.1 and TH4 | <b>TES:</b> Epitope TH4: Immunizing uninfected individuals with rgp160 results in stronger Th response than does natural infection Called Th4.1 and TH4 | with rgp160 results in st   | ronger Th response than    | does natural            |
| gp41(834–848<br>IIIB) | gp41(317–331)  | DRVIEVVQGAYRAIR   | HIV exposure                | human                      | [Clerici et al.(1992)]  |
|                       | NOTES: • Epitope TH4: Cell-me • Called Th4.1 and TH4           | TES: Epitope TH4: Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men Called Th4.1 and TH4                                | V-1 peptides in HIV-1 ex    | posed seronegative men     |                         |

## HIV Helper-T Cell Epitopes

| Env Env NOTES:   | • NO  | gp41(842–856 gp41(332–346) HIPRRIRQGLERILL<br>IIIB B10) | NOTES:  • Suggested H-2 <sup>d,t4</sup> epitope based on region of overlap | gp41(846–855 gp41(329–338) AIRHIPRRIR  | NO'  | gp41(846–860 gp41(329–343) AIRHIPRRIRQGLER | NOTES:  • Suggested H-2 <sup>k</sup> epitope based on region of overlap | gp41(841–848 gp41(324–331) QGAYRAIR  | • NO   | gp41(841–855 gp41(324–338) QGAYRAIRHIPRRIR | NOTES:  • Epitope TH4: IL-2 producti • Called Th4.1 and TH4   | gp41(834–848 gp41(317–331) DRVIEVVQGAYRAIR<br>IIIB) | Location WEAU Sequence |
|--|---|---|--|--|--|--|---|--------------------------------------|--|--|---|---|------------------------|
| HIV-1 exposure human [Mazzoli electrics:  Study of HIV-specific immunity in seronegative partners of HIV-positive individuals – Env peptides could stimulate IL-2 production in 9/16 HIV-exposed seronegative individuals, and only 1/50 low-risk controls | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses | LERILL HIV infection                                    | ased on region of overlap  | R IIIB gp160                           | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four | RQGLER IIIB gp160                          | ed on region of overlap   | IIIB gp160                           | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four | HIPRRIR IIIB gp160                         | YTES:  Epitope TH4: IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals Called Th4.1 and TH4 | GAYRAIR HIV infection                               | Immunogen              |
| ure human<br>sitive individuals – Fny pentides c   | evoke T-cell responses  | n human   |  | $\mathrm{murine}(\mathrm{H-2}^{d,t4})$ | of three or four MHC types   | $\mathrm{murine}(\mathrm{H-2}^{d,t4})$     |   | $\mathrm{murine}(\mathrm{H-2}^{i5})$ | of three or four MHC types   | $\mathrm{murine}(\mathrm{H-2}^{d,t4,i5})$  | om asymptomatic HIV-positive ir   | n human   | Species(HLA)           |
| [Mazzoli et al.(1997)] could stimulate   |   | [Wahren et al.(1989b),<br>Wahren et al.(1989a)]         |  | [Hale et al.(1989)]                    |  | [Hale et al.(1989)]                        |   | [Hale et al.(1989)]                  |  | [Hale et al.(1989)]                        | ndividuals  | [Clerici et al.(1989)]                              | References             |